

An unusual case of a true aneurysm of the dorsalis pedis artery in a young man — an eight years observation

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Abstract

We present a case of a 21-year-old man, physically active, a few months after a torsion injury of the left ankle periodically began to have persistent problems similar in nature to Raynaud's phenomenon in the left foot, especially after exposure to cold and prolonged immobilization of the ankle, in ski shoes, for example. Initial Duplex Doppler ultrasonography revealed an abnormal lateral course of the distal segment of the left anterior tibial artery and the initial section of the dorsalis pedis artery and a small true aneurysm of the dorsalis pedis artery in the talus area. The changes were confirmed by a Computed Tomography Angiography test. At the same time, the immune and inflammatory origin of reported symptoms was excluded. After conservative treatment (rest, avoidance of cold temperatures, aspirin at a dose of 75 mg/day), relief of the symptoms was achieved during six-month medical supervision. During further observation, patient started again his physical activity (soccer, skiing). After 8 years of onset, he remains asymptomatic. He is observed as an out-patient.

Key words: true aneurysm; dorsalis pedis artery

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Introduction

Aneurysms below the popliteal artery is a very rare phenomenon, especially in the dorsalis pedis artery. The majority of aneurysms are of known origin, mainly traumatic or iatrogenic. However, true aneurysms of the dorsalis pedis artery occur very rarely. According to the review of the literature, only 20 cases of varied and often unclear etiology have been identified so far [1], two of them are related to bilateral synchronous changes [1, 2]. Due to limited occurrences of these anomalies, there is little clinical data on the natural history and symptomatology. Consequently, precise therapeutic procedures have not been established

clearly and must be considered individually, depending on the case.

Case report

A 21-year-old man, actively involved in sport (soccer, skiing), was sent to our hospital due to the occurrence of troublesome symptoms for several months similar in nature to the symptoms of Raynaud's phenomenon: sudden tingling, numbness, pain and blanching of the great toe and pain on the plantar side of the left foot (Fig. 1). The symptoms appeared for the first time while skiing in minus temperatures and have re-appeared periodically since, especially after prolonged immobilization of the foot or exposure to cold, and the

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Figure 1. Paleness of the third and fourth toes of the right foot

symptom suppression period varied and sometimes even lasted a few days.

In an interview, the patient reported that a torsion injury of the left ankle occurred about one year before — treated conservatively. Moreover, medical history revealed removal of the left palatine tonsil, hypo-sensitization therapy for grass pollen allergy and Gilbert's syndrome detected five years before. There was no data on the anamnesis leading to other potential vascular pathologies in this patient or in his family members. The patient did not report any complaints from other areas of the body, including the other limbs.

Physical examination of the left foot revealed unchanged skin with proper warmth comparable with that of the opposite side and full mobility of the ankle joint. The pulse was present in all the places on the lower extremities where it is typically found, including dorsal arteries of the foot, which was confirmed by ABI measurement at rest using the blind Doppler method. Inconclusive results were obtained in a nail fold capillaroscopy test of the big toes, but the morphology of capillaries pointed more to the secondary nature of Raynaud's symptoms. The basic laboratory tests showed no significant deviations, except for a slightly elevated level of bilirubin with a predominance of the intermediate fraction, observed in Gilbert's syndrome. Proper marking of inflammation indicators and tests for the presence of various common autoantibodies, including crioglobulin, excluded the inflammatory and immune background of reported disorders.

The Duplex Doppler ultrasonography revealed a correct picture of the aorta, iliac arteries, femoral and lower leg arteries, and those of the right foot. On the left leg, however, attention was drawn to the distal segment to an unusual course of the anterior tibial artery and the initial section of the dorsalis pedis artery; this course was more lateral and twisting around the lateral malleolus, and the dorsalis pedis artery had

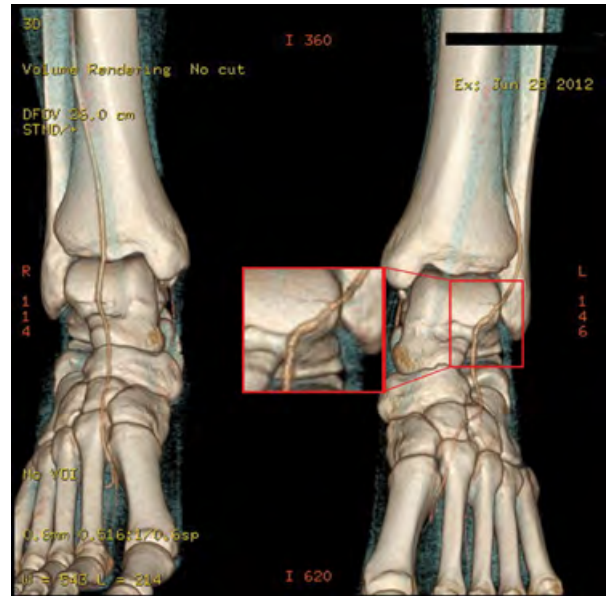


Figure 2. Angio CT — atypical localization of tibial anterior artery and dorsalis pedis artery aneurysm

a short, aneurysm extension in the talus area. In order to further refine the assessment, a contrast Computed Tomography Angiography test was done, which confirmed the atypical course of the above-mentioned arteries and allowed for a better view of a small (20 mm long × 6 mm wide) fusiform aneurysm of the left dorsalis pedis artery with an associated thrombus, slightly narrowing the lumen (Fig. 2).

On the basis of test results and the whole clinical picture, it was decided to continue conservative treatment and behavioral observation. As part of the treatment, Aspirin at a dose of 75 mg/day as well as avoiding injuries, low temperatures, and any overloading of the left lower limb was recommended. The patient reported for a check-up after about six months, reporting improvements in the form of only occasional occurrence of symptoms of very low intensity and rapid recovery from them. The dimensions of the aneurysm did not increase, based on the ultrasonography control test. After 8 years of onset, he remains asymptomatic. The patient started again his physical activity as before. He is further monitored as an out-patient. Periodical duplex doppler ultrasound assessment revealed patency of the vessel with stabile aneurysm diameter (Fig. 3).

Discussion

The dorsal artery of the foot is a very rare location for the occurrence of aneurysms. The most common of these are false aneurysms, arising mainly as a result of a non-penetrative blunt trauma, such as twisting the ankle or bruising the area, but also as a result of a penetrating trauma caused by a sharp object or fractures [3].

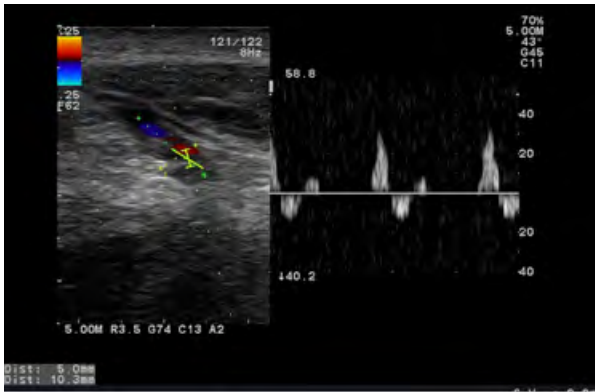


Figure 3. USG doppler as a control examination after 8 years

iatrogenic causes should also be mentioned, such as cannulation of the dorsal digital veins of the foot [4], surgical removal of a gelatinous cyst on the tendon [5], or other orthopedic procedures, especially in the field of ankle arthroscopy [6–8]. All of these situations may result in breaking the continuity of the vessel wall, the escape of blood into the surrounding tissues around the fibrous capsule, and the formation of a false aneurysm.

True aneurysms of the dorsalis pedis artery are even less common. In some reported cases, particularly in patients with such risk factors as diabetes [5, 9–11] and hypertension [3, 5, 9, 12–14], the possible cause of the aneurysm can be seen in the underlying degeneration of the wall caused by atherosclerosis, which has been repeatedly confirmed by histopathology [1, 9, 13]. Another possible etiology is an inflammatory (*mycotic*) aneurysm, which could arise as a result of several situations, such as bacterial embolism with coexisting bacterial endocarditis, generalized sepsis, use of infected intravascular catheters or stents, intravenous drug use and, less often, by the spread of infection to the wall of the artery by continuity from the surrounding tissues [3]. Other possible reasons include cellular degeneration of the tunica media, Ehlers-Danlos syndrome, or other collagenopathies [13]. Among potential factors that predispose to the formation of a true aneurysm, the role of injuries is brought to attention, especially repetitive microtraumas conducive to the formation of thin artery walls and thereby accelerating the formation of an aneurysm [1, 3, 9].

Symptoms of an aneurysm of the dorsalis pedis artery primarily include a pulsating tumor, pain, tenderness and sometimes itching [9, 15]. Additional symptoms such as compression of adjacent structures (e.g., a vein or a nerve) or foot pain when taking a certain position of the body (e.g., vajrasana sitting position), may depend on the location and size of the aneurysm [13]. It is also worth mentioning that the discomfort associated with wearing shoes, which in addition causes pain by chronic

irritation, may even increase the risk of acute ischemia, contributing to the formation of *in situ* thrombosis or embolism [3].

Because there are slight chances of aneurysms occurring below the level of the popliteal artery, including the dorsalis pedis artery, their natural history is little known compared to aortic and popliteal artery aneurysms. Such complications as spontaneous rupture of an aneurysm of the dorsalis pedis artery [12] or acute ischemia of the forefoot due to thrombosis of an aneurysm and systemic embolism, have been reported in literature [16]. It is partly because there is a possibility of such complications occurring that most authors believe that any changes in this area should be operated. On the basis of several reported cases, it is believed that small and so-called “asymptomatic” aneurysms can be successfully monitored even over several years [13]. Possibilities of surgery include ligation of changes and cutting out or leaving, and in some cases, implementing reconstruction of the vessel, particularly in patients with underlying plantar arch artery insufficiency or failure or occlusion of the posterior tibial artery [5, 9, 13].

This report, against the background of many previous works [3, 5, 9], confirms that the Duplex Doppler ultrasonography is sufficient for the diagnosis and initial evaluation of a small aneurysm of the dorsalis pedis artery. Thanks to its non-invasiveness, availability, and low cost, it is also a very useful test to continue monitoring the changes. Other methods, such as Computed Tomography Angiography or Magnetic Resonance Imaging, are extremely useful particularly in the more accurate assessment of vascular anomalies; however, they are characterized by difficult accessibility, a higher cost, and require a contrast agent. Contrast angiography and digital subtraction angiography are considered to be more sensitive tests, but also more invasive, therefore they are reserved for the assessment of diagnostically difficult changes or applied for planning simultaneous therapeutic intervention.

Conclusions

Due to the small size of the aneurysm defined in the present patient, uncharacteristic symptoms appearing periodically, and subjective improvement after conservative treatment, it was decided to leave the patient for further ambulatory observation. We considered surgical treatment if the symptoms worsen or the size of the aneurysm increases, but after eight years of observation, the patient is still asymptomatic.

Conflict of interest

None.

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